

**The Chino Fault and Its Relation to Slip on the Elsinore and Whittier
Faults and Blind Thrusts in the Puente Hills**
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Abstract

The Chino reverse-separation fault separates from the Elsinore fault south of Corona and extends northward through the Chino Hills, dying out in the Los Serranos suburb of the city of Chino Hills. Absence of thickness variations within the Miocene Puente Formation indicates that the Chino fault is post-Miocene. Absence of locally-derived detritus in the Pliocene Fernando Formation in the Chino Basin suggests that the fault post-dates the Fernando as well. East of Prado Dam, the fault is parallel to the pre-Fernando Sardco and Prado-Corona normal faults, indicating that the Chino fault probably reactivated a Miocene zone of normal faults in a half-graben. Offset of the contact between the Yorba Member and the Sycamore Canyon Member of the Puente Formation shows that the Chino fault is oblique slip, with right-slip estimates of 700 to 1350 m near Mahala Oil Field based on offset isopachs of the Soquel Member of the Puente Formation. Vertical separation between the crest of the Mahala anticline and the bottom of the Chino Basin is as high as 700 m, decreasing to zero north of the Chino Hills. The maximum net oblique slip is 850-1525 m. The Chino fault, Mahala anticline, and Ridge syncline are related structures, and all three die out north of the Chino Hills. Maximum shortening across the folds and fault is 400-500 m. If the Chino fault began to form at the time of uplift of the Chino Hills, and if the uplift began at the same time as that of the Puente Hills, 700-1200 ka based on the age of drainage basins, the long-term slip rate on the Chino fault is 0.7-2.2 mm/yr.

The late Quaternary vertical separation rate on the Chino fault near Prado Dam was estimated as 0.06 mm/yr, but the age of offset sediments was estimated, not determined radiometrically. A trench across the fault in the northern Chino Hills, where the vertical separation of the Sycamore Canyon-Yorba contact is 300 m in contrast to 600-700 m farther southeast, gives evidence of at least two rupture events on the fault in the last 11,550 yrs and an average oblique-slip rate of 0.36-0.51 mm/yr. Offset ridge lines and deflected and beheaded drainages show right-lateral deflections of 25-100m; stream captures may mask larger deflections of 400-500 m. The Chino fault has demonstrated Holocene activity, but the late Quaternary rate is insufficiently constrained for seismic hazard analysis. On the other hand, the Central Avenue fault within the Chino Basin shows no sign of late Quaternary activity; it marks the hingeline between the Chino Basin and the Perris Block to the east.